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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 25 of the	)	ET Docket No. 98-206
Commission's Rules to Permit Operation	)	RM-9147
of NGSO FSS Systems Co-Frequency with	)	RM-9245
GSO and Terrestrial Systems in the Ku-	)	
Band Frequency Range;	)	
	)	
Amendment of the Commission's Rules	)	
to Authorize Subsidiary Terrestrial Use	)	
of the 12.2-12.7 GHz Band by Direct	)	
Broadcast Satellite Licensees	)	
and Their Affiliates; and	)	
	)	
Applications of BroadWave USA, PDC	)	
Broadband Corporation, and Satellite	)	
Receivers, Ltd. to Provide a Fixed Service	)	
in the 12.2-12.7 GHz Band	)	

COMMENTS OF DIRECTV, INC.

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COMMENTS OF DIRECTV, INC.

DIRECTV, Inc. ("DIRECTV")[1] hereby offers the following comments in connection with the Commission's Further Notice of Proposed Rulemaking ("Further Notice") in the above-captioned proceeding.

I. INTRODUCTION & SUMMARY

This proceeding needlessly jeopardizes the receipt of Direct Broadcast Satellite ("DBS")[2] service by millions of consumers across the United States. DBS operators, after literally billions

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1 DIRECTV is a wholly-owned subsidiary of DIRECTV Enterprises, Inc., a licensee in the DBS service and a wholly-owned subsidiary of Hughes Electronics Corporation.

2 DBS is known internationally as the Broadcasting-Satellite Service ("BSS") and the terms are used herein interchangeably.

of dollars of investment, are delivering in full force on their promise of increased competition to dominant incumbent cable operators in the multichannel video programming distribution ("MVPD") market. In more than seven years since the first DBS satellite was launched, the service has become the "principal competitor to cable television service with 12,987,000 subscribers as of June 30, 2000."[3] DBS providers differentiate themselves in the MVPD marketplace by offering higher quality service than cable operators and greater service reliability relative to cable television service.[4] These important customer benefits are now in serious and wholly unnecessary jeopardy.

Specifically, in this proceeding, the Commission has tentatively accepted the proposal of Northpoint Technology, Ltd. ("Northpoint") to introduce a secondary terrestrial point-to-multipoint service in the 12.2-12.7 GHz band -- the "mission critical" spectrum for primary DBS operations. Stepping back to canvass the effect of this action on the DBS service and DBS

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3 Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, *Seventh Annual Report*, CS Docket No. 00-132 (Jan. 8, 2001) ("2000 MVPD Competition Report"), at ¶ 61.

4 In the a recent report prepared by the Yankee Group for the Satellite Broadcasting & Communications Association, 66% of recent DBS subscribers said their desire "to get a clearer picture and sound" contributed to their decision to subscribe to satellite TV and 9% said it was the most important reason for subscribing. Out of nine reasons presented in the survey, this differentiating factor placed a close third just behind "to get more channels" (at 79%) and "for a greater movie selection" (at 69%) as the reasons that contributed to these subscribers' purchase of satellite television. *See* Yankee Group/SBCA, "2000 Satellite Consumer Market Research Studies: DBS Subscriber Study." *See also* Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming, *Sixth Annual Report*, CS Docket No. 99-230 (rel. Jan. 14, 2000), at ¶ 72 (according to survey of DBS subscribers, primary advantages of DBS over cable include "digital quality picture").

consumers in conjunction with other facts and events, the decision seems unfathomable.

Consider:

- For two decades, the Commission has sought to foster the success of DBS by transitioning terrestrial operations *out* of the 12 GHz band,[5] in acknowledgement of the interference problems such operations pose for ubiquitously deployed DBS receiving equipment. Those were discrete, point-to-point microwave systems. The Commission now proposes to re-introduce terrestrial operations into the DBS downlink band on a ubiquitous, massive scale.

- This same proceeding authorizes the co-primary downlink operations of NGSO FSS systems in the 12 GHz band – a decision that in itself is a monumental one and a product of more than two years of rigorous analysis by U.S. BSS operators, the Commission and potential NGSO FSS providers in international fora. Northpoint-like operations would add yet a third sharing overlay to the mix when it is not even known what the full implications of DBS-NGSO FSS sharing will be.

- The Commission has consistently concluded that ubiquitously deployed satellite and terrestrial services *cannot* feasibly share the same spectrum.[6] Indeed, in this very proceeding, the

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5 *See* Public Notice, *Initiation of Direct Broadcast Satellite -- Effect on 12 GHz Terrestrial Point-to-Point Licensees in the Private Operational Fixed Service,* 10 FCC Rcd 1211 (1994) (Relocation "of existing 12 GHz [terrestrial] users was deemed necessary because of the likelihood of interference that terrestrial use would cause to DBS service if both were operating in the same geographic area"); *Inquiry into the development of regulatory policy in regard to Direct Satellites for the period following the 1983 Regional Administrative Radio Conference*, 90 FCC 2d 676 (1982).

6 *See, e.g.,* In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5 and 30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, *First Report and Order and Fourth Notice of Proposed Rulemaking*, 11 FCC Rcd 19005 (1996), at ¶ 26 (concluding that "co-frequency sharing between GSO FSS or NGSO FSS ubiquitously deployed terminals and LMDS with its ubiquitously deployed subscriber terminals, is not feasible at this time"). The Commission reached similar conclusions at 18 GHz, In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, *Report and Order*, IB Docket No. 98-172 (rel. June 22, 2000), at ¶ 17 ("The vast majority of the commenters agreed with our tentative conclusion that co-frequency sharing between terrestrial fixed service and ubiquitously deployed FSS earth stations in the 18 GHz band is not feasible. . . We continue to believe that separation of these operations into different dedicated sub-bands is an effective frequency management

Further Notice concludes with respect to the DBS uplink band (17.3-17.7 GHz), which is also allocated for future DBS downlinks, that the sharing of ubiquitous BSS downlinks with NGSO FSS uplink earth stations would be "very difficult" and "overly restrictive on ubiquitous BSS receivers," and therefore is *not feasible*.[7] The Commission's contrary conclusion with respect to the proposed MVDDS service at 12 GHz is inexplicable.

- Northpoint has shown neither the technical capability nor the incentive of co-existing with DBS operations. Even when Northpoint was "pitching" its service as complementary to DBS, every high-power DBS operator providing commercial service that examined Northpoint's technology vigorously opposed the introduction of Northpoint operations into the DBS downlink band.[8] Now that Northpoint has re-cast itself as a DBS competitor, the idea that Northpoint will operate in the DBS downlink band as a "good citizen" on a non-interference basis is untenable.

- The "new" proposed MVDDS service is nothing more than another proposed fixed wireless service offering video and broadband capabilities.[9] There is no reason that it cannot be accommodated in other frequency bands, such as 2.5 GHz (MMDS), 24 GHz (DEMS), 28 GHz (LMDS), or 39 GHz -- spectrum expressly allocated for uses functionally identical to those that Northpoint proposes. Northpoint itself suggests that its technology is suitable for

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technique to resolve problems of coordinating terrestrial fixed service links with ubiquitously deployed satellite earth stations."), and 39 GHz. See In the Matter of Amend of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, 12 FCC Rcd 18,600 (1997) (noting "wide support for the premise that the types of fixed and satellite services likely to be offered in spectrum above 36 GHz will not be able to share the same spectrum blocks").

7 Further Notice at ¶ 158.

8 *See* ET Docket No. 98-206, Comments of DIRECTV at 23-32 & Technical Appendix B; Comments of EchoStar at 8-15 & Technical Appendix B; Comments of USSB at 4-12; *see also* Comments of the Satellite Broadcasting and Communications Association ("SBCA") at 3-7.

9 Like LMDS, the proposed MVDDS should not be thought of as unique for broadband or video service provision: it "is neither a 'specific' service nor a specific technology" and is merely spectrum that "in theory, can be used to provide, or assist in the provision of consumer services such as video, voice, data, and broadband telecommunications services generally." Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, *Third Report and Order and Memorandum Opinion and Order*, 15 FCC Rcd 11857 (2000), at ¶ 26.

deployment in a variety of other frequency bands.[10] Thus, there is no reason to expose DBS consumers to the harmful interference now proposed.

The bottom line is that the Northpoint proposal under consideration is guaranteed to undermine the service quality and reliability of the DBS service. The Commission's tentative decision as to the feasibility of co-sharing at 12 GHz among *three* ubiquitously deployed services is ill-considered and ill-advised. Next week, for these and other reasons, DIRECTV will request the Commission to reconsider its threshold decision to introduce mass market terrestrial operations into the 12 GHz band.

However, if the Commission refuses to do so, and if existing and future DBS consumers are to be placed by the Commission in a situation that will likely result in longer and more frequent service outages and serious degradation of their service, then it is absolutely imperative that the Commission act here to provide for as much protection for these subscribers as possible.

In the Comments below, DIRECTV offers detailed proposals that are designed to ensure that the harmful interference effects of Northpoint operations at 12 GHz are minimized. DIRECTV's proposals are based upon DIRECTV's experience in negotiating similar protection criteria to minimize harmful interference stemming from the co-existence of NGSO FSS and BSS operations. In particular, the Commission must:

- define the overall principles that will govern DBS/MVDDS sharing;
- establish particularized DBS/MVDDS sharing criteria and MVDDS epfd limits;
- establish a complete set of DBS links to be protected;
- establish the reference parameters and analytical method/models to be used; and

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[10] *See* www.northpointtechnology.com/html/spectrum_planning.html (advocating that Northpoint technology be used in a number of different frequency bands).

- introduce terrestrial sharing at 12 GHz carefully, through an initial deployment demonstration phase designed to gather further data on the interference implications of proposed MVDDS terrestrial system design before service is deployed on a wide-scale basis.

These steps are discussed in detail below.

DIRECTV also offers comment on certain other issues raised in the Further Notice. To the extent that the Commission decides to assign MVDDS licenses, whether by auction or otherwise, there is no basis for excluding DBS operators from acquiring them. DBS providers have no market power in the relevant product market at issue, and there is no reason that they should not be permitted to use MVDDS spectrum on a complementary non-interference basis to enhance their competitive position relative to dominant cable operators.

Along similar lines, the efforts of Northpoint to insulate itself from the Commission's traditional and tested methods of assigning fixed wireless licenses should be rejected. Northpoint has no "cut-off" protection relative to other potential MVDDS applicants that may apply for such licenses if and when the service is authorized at 12 GHz (or hopefully, in some other frequency band) and a filing window is opened by the Commission. Northpoint's pending applications to provide service are prematurely filed and should be dismissed.

II. IF THE COMMISSION AUTHORIZES SECONDARY TERRESTRIAL SYSTEMS AT 12 GHz, THERE MUST BE STRINGENT CRITERIA IN PLACE TO PROTECT PRIMARY DBS OPERATIONS

The Further Notice recognizes that a new Fixed Service created at 12 GHz cannot be permitted to cause harmful interference to the BSS.[11] The goal of this proceeding is to set "technical parameters for MVDDS operations that will limit the permissible level of increased DBS service outage that may be attributable to MVDDS below any level that could be considered

harmful interference."[12] Given the stakes involved, it is crucial for the Commission to achieve this goal, and to adopt meaningful procedures, parameters and criteria that will establish the protection of primary DBS operations at 12 GHz. DIRECTV below outlines the process that the Commission should follow in pursuing this goal, which is based upon DIRECTV's experience in negotiating similar protection criteria to minimize harmful interference stemming from the co-existence of NGSO FSS and BSS operations.

A. Overall Policy Guidelines For Developing Spectrum Sharing Service Rules

First, in order to minimize harmful terrestrial interference into DBS systems, there are six fundamental principles that must be incorporated into any approach that the Commission adopts with respect to DBS/MVDDS sharing.

1. Each proposed MVDDS system must limit impact on unavailability to 2.86% of current DBS performance

The Further Notice states that the Commission intends to "set technical parameters for MVDDS operations that will limit the permissible level of increased DBS service outage that may be attributable to MVDDS below any level that could be considered harmful interference."[13] DIRECTV strongly supports this goal, which is usefully grounded in the approach and careful study undertaken internationally with respect to such sharing issues.

In particular, DIRECTV agrees that "[i]n the interest of providing DBS subscribers with a high degree of protection," the percentage of DBS unavailability that a proposed MVDDS system would be permitted to cause any DBS provider should be "the same as a single NGSO system,

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11 Further Notice at ¶ 213.

12 *Id.*

13 *Id.*

i.e., 2.86%."[14] From the perspective of a DBS operator or subscriber, it does not matter whether the loss in DBS signal availability is generated by interference from an NGSO FSS system or a proposed MVDDS system -- it is the same, and it is cumulative. As the DBS operators have pointed out previously,[15] ITU actions regarding interference into the DBS downlink band were explicitly premised on a determination of the level of performance and quality of service to be achieved by DBS operators, and a corresponding determination of the decrease in performance and service quality that can be tolerated. Those efforts culminated in a 10% cap on the increase in DBS signal unavailability resulting from the aggregate interference to which DBS providers and subscribers can be subject.[16]

In the context of assuming that NGSO FSS operators would be the interference source, the amount of degradation attributable to a single system was determined at the ITU to be 2.86%.[17] This same threshold is and should be applicable to an MVDDS operator at 12 GHz to ensure that there is no additional interference with DBS operations.

2. The increase in signal unavailability due to the aggregation of all interference from NGSO FSS and proposed MVDDS services must be limited to 10%

While DIRECTV believes that the Commission correctly has proposed to limit MVDDS operations to a 2.86% increase in annual DBS unavailability, the Commission also proposes that the MVDDS degradation of 2.86% would be allowed "*in addition to* the aggregate 10% caused

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14 *Id.* at ¶ 268.

15 *See* DIRECTV and EchoStar, *Ex Parte* Letter to Magalie Roman Salas (Nov. 8, 2000).

16 *Id.*; *see* DIRECTV, Inc., "Conclusions to Date Regarding Harmful Interference from a Proposed Northpoint Technology Terrestrial System Operating in the DBS Downlink Band, 12.2-12.7 GHz (Jan. 27, 2000) ("DIRECTV January 2000 Ex Parte"), at 31-33.

17 *See* DIRECTV January 2000 Ex Parte at 33.

by NGSO FSS operations," opining that the 2.86% increase in unavailability "would be *de minimis* and would not have a significant impact on the BSS."[18]

This assertion is not true. As the DBS operators have explained previously in this proceeding, DBS providers have moved toward higher availabilities with the buildout of digital satellite transmission systems, and continue to do so.[19] Thus, for example, the availability planning objective of 99.7%, as stated for the original analog FM-based BSS Plan was for FM systems operating at a carrier-to-noise power ratio ("C/N") of 14 dB, which is several dB above the FM "threshold" of approximately 10 dB (or even less with threshold extension FM receivers). Since FM television systems deliver high quality pictures at any C/N above threshold, the BSS Plan objective in fact guarantees very high quality pictures with availabilities much higher than 99.7%. In order to have roughly the same quality viewing experience with digital systems -- *i.e.*, to roughly match the time over which a picture is viewable -- digital systems must also have availability values at the digital threshold that are much higher than an annual average of 99.7%.[20] For these reasons, U.S. DBS operators and satellite communications design engineers around the world are striving to build and preserve very high DBS availability values upon which the BSS Plans were based.

The expected reliability for DBS services is not a subjective judgment of DBS providers. First, the concept of protecting existing high availability performance levels has already been

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18 Further Notice at ¶ 213.

19 *See, e.g.*, DIRECTV and EchoStar, "Rebuttal to Northpoint's Evaluation and Analysis of DBS-Terrestrial Compatibility Testing at Oxon Hill Maryland" (Sept. 20, 2000), at 2-3; DIRECTV, "Further Response to Northpoint Ex Parte Filings" (Sept. 20, 2000) ("DIRECTV Further Response"), at 6-10.

20 *See* DIRECTV and EchoStar *ex parte* letter (Nov. 16, 2000).

considered and accepted by the ITU. Indeed, the FCC and the United States *championed* this issue in the NGSO FSS sharing studies. Second, as shown previously by DIRECTV, a typical link shown in newly-adopted ITU BSS planning parameters for Regions 1 and 3 has an annual availability value of 99.998%.[21] Third, such availability responds to consumer telecommunications and technology preferences and expectations, as witnessed, for example, by Microsoft's recent "five nines" advertising campaign.[22] Fourth, DBS providers have invested billions of dollars to achieve such availability values, and have relied on the Commission to continue to foster this high level of service.[23]

For these reasons, "acceptable degradation" of the DBS service should be calibrated to the standard officially recommended by the ITU: a *total* of 10% increase in unavailability from all sources of interference, satellite or terrestrial, based on the expected reliability values set forth above. Again, recent ITU actions regarding interference from NGSO systems were explicitly premised on a decision by the ITU about the level of performance and availability of service needed by DBS systems, and the corresponding amount of decrease in this availability that DBS operators can be asked to accept. The ITU specifically found that a DBS operator "should be able to control the overall performance of a network, and to provide a quality of service that

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21 DIRECTV Further Response at 6-10.

22 *See* www.microsoft.com/windows2000/guide/server/solutions/overview/reliable/ ("In the IT industry, server operating system reliability is expressed in terms of "nines." For example, 99.99 percent uptime is referred to as 'four nines' and 99.999 percent uptime is referred to as 'five nines.' Regarded as the highest number realistically achievable, five nines equates to less than five minutes downtime per year.").

23 *See* Further Notice, Separate Statement of Commissioner Harold Furchtgott-Roth (discussing DBS operator expectations of interference protection and availability rates needed to compete effectively in the marketplace).

meets C/N performance objectives," and that, to allow this, "there needs to be a limit on the aggregate interference a network must be able to tolerate from the emissions of *all other networks*."[24] A decision that permits Northpoint to exceed the 10% aggregate cap on unavailability increase would directly violate these ITU findings, since DBS operators would not be able to ensure the level of performance and availability of service that was the explicit bases of the ITU actions in the NGSO sharing context. If the 10% aggregate increase in unavailability does not include proposed MVDDS system interference, the entire premises of NGSO FSS/BSS sharing will be completely undermined; simply put, BSS operators did not agree to and never would have agreed to any proposal that would increase total aggregate unavailability degradation beyond 10%.

If the interference into DBS from all sources, including Northpoint-like technologies, were to exceed that 10% unavailability increase, the DBS performance and reliability goals that are explicitly set forth in the recent ITU decisions could not be achieved. U.S. DBS operators have consistently observed that the protection of the BSS requires that (i) the combination of NGSO FSS interference and terrestrial (here, MVDDS) interference in the aggregate degrade the operational outage time of the BSS by no more than 10%, and (ii) neither service cause outages during clear sky propagation conditions. It is therefore fundamentally important that each network, either NGSO-FSS or MVDDS, meet these criteria -- both individually and in the aggregate -- so that the overall impact on DBS service is limited to 10%.

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[24] Recommendation ITU-R BO.1444, *considering further* (a) and (b) (emphasis supplied). The ITU further found that degradations to DBS performance and availability "may be due to propagation anomalies, other GSO networks and *other systems*." *Id.*, *considering further* (j) (emphasis added).

3. Equal protection must be afforded to all present and future DBS customers

The DBS operators have consistently emphasized that all DBS customers must be equally protected from interference sources at 12 GHz. The Commission essentially has agreed with this point, stating that, in crafting service rules, all customers should be protected to the same worst-case level of unavailability degradation, rather than averaging the impact over proposed MVDDS service areas, as Northpoint has proposed.[25] Work in the ITU-R has ensured equal protection of all present and future DBS customers from NGSO FSS interference, and the same guarantees are necessary for protection from MVDDS interference.

It is right for the Commission to recognize the need to minimize the potentially severe increase in unavailability that could be experienced by DBS customers unlucky enough to be located near an MVDDS transmitter. However, the Commission must also recognize that adequate protection of *future* customers is just as important as protection of present customers.

In this regard, the FCC has proposed to limit MVDDS operators' affirmative obligation to correct harmful interference into DBS operations to a window of 18 months after the installation of the MVDDS transmitter.[26] After this time period, MVDDS operators would only be required to provide "technical information and advice" to DBS subscribers on how to mitigate harmful interference from MVDDS operations, but would not be required to take further action if such harmful interference is being generated.[27]

This approach is utterly unacceptable. To the extent that the Commission's proposed procedure is similar to that used to address FM blanketing interference in the FM radio service,

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25 Further Notice at ¶ 217.

26 *Id.* at ¶¶ 274-75.

the analogy fails. There are manifest differences in the nature of the interference and in the types of radio services involved. These differences make it inappropriate to apply FM blanketing-interference procedures to MVDDS interference into DBS in the manner the Commission proposes, and are enumerated as follows:

- In the FM case, the Commission is dealing with an intra-service interference problem -- one FM broadcasting station interfering with reception from other FM broadcasting stations. Each station uses a terrestrial transmitter, its signals are subject to the same type of radiowave propagation, and station design and operation are governed by a common set of rules. In the case of MVDDS interfering with DBS, however, there is an inter-service sharing problem in which the characteristics of the two services are fundamentally different. For example, the terrestrial transmitter is interfering on an overland path with DBS transmissions that reach the receiver on a space-to-earth path that has quite different propagation characteristics. Moreover, the DBS systems have been designed and are operating under specific technical and regulatory constraints that were well-established both domestically and internationally without allowance for local terrestrial interference. Indeed, for excellent technical reasons, the international regulations consider only the case of terrestrial transmitters located some distance beyond the edge of the DBS service area interfering with DBS receivers inside the service area.

- The relationship between the service areas of the interfering transmitters and victim receivers in the two cases forms an even more significant difference. In the FM-FM case, the interference arises when an FM station is established to cover a new service area that typically does not overlap existing FM service areas, but rather lies at or beyond the fringe reception areas of the existing FM transmitters. In the MVDDS case, the service area of the interfering transmitter would lie *totally within* the service area of the existing DBS systems.

- A third fundamental difference lies in the spectral extent of the interference. In the FM-FM case, the new FM station broadcasts on only a single channel and, except in extreme cases, only interferes with reception from existing FM stations operating on that channel. In the MVDDS case, the MVDDS transmitter (or transmitters if the band is split between more than one MVDDS operator in a given market area) would operate on all 32 of the DBS RF channels. Thus, in contrast to the FM case, the introduction of MVDDS would simultaneously interfere with all of the channels available to DBS subscribers.

- The most serious difference between FM-FM interference and MVDDS-DBS interference points to the potentially fatal flaw in attempting to apply the FM blanketing approach. It is the totally different effect of the interference on reception. In the FM-FM case, the FM capture effect makes the interference truly "blanketing" -- it is omnipresent and immediately

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[27] *Id.*

obvious to the listener. In the MVDDS-DBS case, the interference will be truly blanketing *only* for DBS subscribers close to the MVDDS transmitter. For most other subscribers near the MVDDS transmitter, interference will manifest itself in terms of a more frequent occurrence of the freeze-frame condition or a total loss of picture at times when the DBS signal is already attenuated by rainfall. The consequent reduction in DBS availability can be much greater than that prescribed by the Commission's proposed rules, and yet it will not be totally obvious to the subscriber that this dramatic degradation in service quality is in fact caused by a local interference source. DBS subscribers will be more likely to blame the poor service quality on the satellites or the DBS broadcast system rather than on this local source of interference.

More fundamentally, the Commission's 18-month window effectively means that after the window closes, MVDDS will become a co-primary service with DBS. After 18 months, the Commission's proposal essentially removes any obligation of Northpoint to provide service on a non-interference basis to DBS, and instead leaves it to the DBS subscriber to mitigate the interference, if that is even possible. This is utterly unacceptable.

Mitigation at a DBS customer's premises to accommodate a secondary service, which by definition is obligated *not* to harm subscribers' receipt of the primary service, cannot be required. DBS subscribers in many instances already must use careful placement of their receive antennas to ensure a clear line of sight to DBS satellites. Adding another parameter to this placement process in order to avoid harmful MVDDS interference will necessarily mean that a certain percentage of DBS subscribers must choose between tolerating harmful interference into their DBS service or receiving no DBS service at all. That is a Hobbesian choice to which DBS customers should never be put in the first instance.

4. No direct interactions can be allowed between MVDDS operators and DBS customers

The Commission appears to place a fundamentally misguided emphasis on mitigation options at a DBS subscriber's premises that it believes might be used to enhance the feasibility of

DBS-MVDDS sharing.[28] As a threshold matter, Northpoint's current business model is one that trumpets its intention to compete with both DBS providers and cable operators.[29] Therefore, an expectation that Northpoint has any incentive to achieve meaningful interference mitigation at a subscriber's residence -- short of offering up Northpoint service as a DBS substitute – is fanciful.

If there is to DBS-MVDDS sharing at 12 GHz, the Commission must allocate full mitigation responsibility to the design and location of MVDDS system transmitters, and *not* to DBS customers or their premises. This appears to be consistent with the Commission's expectation.[30] MVDDS transmitters must be designed in such a way that the received interference at *any* potential residence or business location in the area surrounding the MVDDS transmitter meet interference criteria *without requiring DBS customer site mitigation.*

In this regard, it is important to note that for NGSO FSS sharing with DBS, mitigation actions on DBS customer premises to counter NGSO FSS interference are neither being contemplated nor will they be required. NGSO FSS systems designed to meet the established epfd limits will never exceed the "2.86%" interference level over habitable land. Proposed MVDDS sharing with the DBS service must in principle be at least as protective of the DBS service as NGSO FSS operations.

Mitigation at a DBS subscriber's premises effectively makes the DBS service co-primary with or secondary to proposed MVDDS operations. This is fundamentally contrary to the

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28 *See, e.g.*, Further Notice at ¶¶ 216.

29 *See, e.g.*, www.northpointtechnology.com/html/cable_competition.html.

30 See Further Notice at ¶ 273 (proposing various requirements before any MVDDS transmitter begins operation); *see also id.* at ¶ 275 ("We expect that, in the first instance, the MVDDS licensee will site its transmitter to avoid harmful interference to DBS customers").

principle that proposed MVDDS operations cannot cause harmful interference into the DBS service. Moreover, the hallmark of DBS service is its ease of use and consumer-friendly nature. Homeowners, for example, are given the express ability to place and install DBS dishes themselves – and it is this type of user-friendliness that has been part of the inroads DBS has made with respect to cable competition.

Under the epfd approach to DBS-MVDDS sharing, proposed below, if criteria are met over all habitable land, then no mitigation actions are or will be required on the property of either present or future DBS customers. This will provide a clean and simple method of ensuring that users of DBS as a primary service remain, to the extent possible, unencumbered -- either by signal interference or by intrusive mitigation actions on their property. To the extent possible, the Commission should attempt to preserve the DBS service that the agency has (up until these proceedings) aggressively promoted -- an easy-to-use, high quality service for the reception of video, audio and data programming. Introducing massive complications at the DBS subscriber's premises to accommodate a secondary terrestrial service will have a chilling effect on the sale of DBS services that will not serve the interests of the public or of MVPD competition.

5. Protection must be extended to present and future DBS systems

As noted previously, interference protection must clearly be extended to present and future DBS systems. Not doing so will undermine the future growth and development of these systems, as well as their ability to compete with other MVPD services, most notably dominant cable operators.

In the NGSO FSS proceedings, reference link budgets were generated that reflected not only the performance of current operational systems, but also of predicted future systems. When

the interference equivalent power flux density ("epfd") limits were being derived, it became clear that for the NGSO FSS case, these future links were not the limiting case.

This same process must be undertaken with respect to MVDDS in order to make sure that future DBS operations are not jeoparized. Reference links should be generated that represent the best current estimate of future technology. These reference links should then be protected to the "2.86%" criterion, just as present operational links will be protected. Future systems may or may not be the limiting case, but this fundamental determination must be made as a part of this proceeding.

6. Protection must be extended to all potential BSS orbital locations capable of U.S. coverage

Finally, the Further Notice is unclear as to whether its sharing approach and service rules only protect transmissions from currently occupied DBS orbital positions. For the DBS service to succeed, the Commission must ensure that every subscriber and potential subscriber is able to receive DBS signals from any DBS operator. DBS providers can be located over a very wide range of the geostationary arc. In addition to the eight U.S. DBS assigned locations in the BSS Plan ranging from 61.5° to 175° W.L., Canada has assignments at 70.5°, 72.5°, 82°, 91°, 129°, and 138°; Mexico at 69°, 78°, 127°, and 136°; and Argentina at 94°. All of these locations are being used or may be used to provide DBS service to U.S. subscribers (assuming systems can be coordinated). Furthermore, additional assignments may be created in the arc through future BSS Plan modifications. Thus, with such a wide range of assignments and the possibility of future modified assignments, the Commission must ensure that the entire geostationary arc (above some realistic minimum elevation angle) is protected to ensure the continued growth and development of DBS service.

B. Derivation of an epfd Interference Limit from the Proposed Sharing Criteria and Sharing Principles

1. The Epfd Concept

Informed by the sharing criteria and principles set forth above, the next step is for the Commission to establish an engineering parameter to be used as an interference limit. This limit incorporates the sharing principles in a practical way, in that when the limit is satisfied in the field, these sharing criteria are also satisfied. In the case of NGSO FSS sharing with DBS, the agreed limit is defined by the engineering parameter of equivalent power flux density, or "epfd," whose values are specified by "masks" for particular DBS antenna diameters and percentages of time. These masks are universal for all points on the earth.

Epfd can also be used as the interference limit parameter for DBS-MVDDS sharing. In this case, however, the MVDDS epfd will not vary over time, and therefore epfd masks as a function of time are not applicable to this situation. Fixed epfd "limits" can be generated for each DBS link to be protected at any given MVDDS transmitter location. These limits will be different for each MVDDS transmit site, and will manifest themselves as individual epfd contours around the MVDDS transmitter site, one contour for each of the different DBS links that require protection. The limits or contours are a function of many variables, including the direction of the wanted DBS satellite from the victim receiver location. At any given MVDDS transmit site these contours will vary from link to link in shape as well as in magnitude. They will also vary from MVDDS transmit site to transmit site because of variations in satellite e.i.r.p..

In the Further Notice, the Commission has suggested the alternative use of the carrier to interference (C/I) power ratio as the interference limit parameter for the generation of contours. However, an epfd limit is preferred to a C/I power ratio because of the multiple links requiring

protection at any proposed MVDDS transmitter site. In particular, each link will generate its own required C/I ratio for protection. The carrier power "C" will in general be different for each link. As such, it will be cumbersome to reduce the C/I ratios of multiple links to absolute interference powers so they can be directly compared. If instead a maximum interference epfd is calculated for each link, then the epfd values can be directly compared.

For each proposed MVDDS transmitter location, the required epfd values can be easily calculated. A modified version of the interference model already proposed by the FCC in Appendix H to the Further Notice can be used for this calculation. The results of the calculations are epfd contours within which the interference level rises above the "2.86%" criterion.[31]

2. Realization of Required epfd Values

The current proposed designs of MVDDS transmitter sites by Northpoint do not meet the requirement that the power flux density over habitable land be below the "2.86%" criterion. DBS operator field tests in Oxon Hill, MD confirmed this fact.[32] To achieve this requirement, lower

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31 Although epfd is the preferred approach, RSSi values (Received Signal Strength assuming an isotropic receive antenna) could also be used as the limiting parameter. This value is mathematically very similar to epfd in that a received interference level is normalized to a specific victim receive antenna gain value. Epfd normalizes actual interference power flux density to the peak gain of the victim antenna, whereas RSSi normalizes received interference signal strength to a 0 dBi gain antenna. The RSSi calculation technique was used to generate contours found in DIRECTV's *ex parte* filing "Conclusions to Date Regarding Harmful Interference From a Proposed Northpoint Technology Terrestrial System Operating in the DBS Downlink Band, 12.2-12.7 GHz" (Jan. 27, 2000) ("DIRECTV January 2000 Ex Parte").

32 *See* DIRECTV and EchoStar, "Report of Interference Impact on DBS Systems from Northpoint Transmitter Operating at Oxon Hill, MD, May 22 to June 7, 2000" (July 25, 2000) ("Oxon Hill Report"); *see also* DIRECTV and EchoStar, "Rebuttal to Northpoint's Evaluation and Analysis of DBS-Terrestrial Compatibility Testing at Oxon Hill, Maryland" (Sept. 2000).

MVDDS transmit power levels will be needed, possibly coupled with larger MVDDS receive antenna sizes. More aggressive MVDDS transmit antenna beam shaping will be needed as well.

Importantly, this is not an onerous burden on proposed MVDDS operators, who are still in the design phase of their systems. NGSO FSS systems can and will be designed to meet the corresponding requirements, which are critical to effective protection of DBS. The proposed secondary MVDDS service must be required to meet these parameters as well. To date, there has been no significant incentive driving MVDDS system designers towards this goal, and their capability to reach it is therefore unproven.

If secondary MVDDS operations are authorized at 12 GHz, the Commission must make it clear via the service rules it adopts that the DBS service must be adequately protected. While this may add pressure an MVDDS system proponents to re-design their systems to some degree, that pressure is necessary and appropriate. DBS operators have deployed real systems and spent hundreds of millions of dollars to build successful businesses. They have millions of subscribers. Secondary MVDDS systems can and must be designed so that they do not pose an interference problem for these subscribers' receipt of service.

3. Protection Criteria Summary

In summary, DIRECTV proposes the following set of protection criteria and interference limits for MVDDS / GSO BSS sharing. These criteria are based on the final NGSO FSS sharing agreements reached at WRC-00:

1. The aggregate interference caused by the space station emissions of all non-GSO FSS satellite networks and the terrestrial emissions of all MVDDS networks operating in the same frequency band, should, for a GSO BSS network operating in the 12 GHz band:

   a. be responsible for at most 10% of the time allowance(s) for unavailability of the given C/N value(s) as specified in the operational performance objectives of the desired network, where N is the total noise level in the

noise bandwidth associated with the wanted carrier including all other non-time-varying sources of interference;

b. not lead to a loss of video picture continuity[33] in the desired digital GSO BSS and associated feeder-link network under clear-sky conditions; and

c. meet these criteria over all habitable land.

2. The interference caused by the space station emissions of any single non-GSO FSS satellite system or by the terrestrial emissions of any single MVDDS system operating in the same frequency band, should, for a GSO BSS network operating in the 12 GHz band:

a. be responsible for at most 2.86% of the time allowance(s) for unavailability of the given *C/N* value(s) as specified in the operational performance objectives of the desired network, where *N* is the total noise level in the noise bandwidth associated with the wanted carrier including all other non-time-varying sources of interference;

b. not lead to a loss of video picture continuity in the desired digital GSO BSS and associated feeder-link network under clear-sky conditions; and

c. meet these criteria over all habitable land.

3. The Commission should derive and specify epfd limits for each MVDDS transmitter to be operated in the 12 GHz bands shared with BSS be in such a way that:

a. they satisfy the criteria in items 1. and 2. when applied to a set of GSO BSS and associated feeder-link system characteristics that are to be derived through a mechanism described in Section II.C. below, and that are representative of present and future BSS systems operating at that location;

b. they are derived and assessed using the methodology described further in Section II.D. below.

4. The Commission must recognize that a portion of the aggregate interference budget has been reallocated to MVDDS operations, and adjust the number of authorized NGSO-FSS systems accordingly.

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[33] A loss of MPEG video picture continuity occurs when the BER of the demodulated MPEG video bit stream is sufficiently high to cause the associated video MPEG decoder to cease to provide one or more pictures. This condition typically results in the initiation of error concealment techniques by the video decoder, such as the presentation of the last available MPEG picture (freeze frame), presentation of an all black picture, or other techniques.

C. Establishment Of A DataBase Of Links To Be Protected

Just as was done in the NGSO FSS sharing study at the ITU, a full set of links requiring protection needs to be established for DBS-MVDDS sharing to ensure the inclusion of all reasonable DBS operating scenarios at 12 GHz. Each DBS provider has multiple possible operating modes for their current systems. Each DBS provider operates from multiple orbital slots using different spacecraft. Each DBS provider is also working on communication designs for future links. All of these combinations can and must be reflected in a set of reference link budgets.

The starting point for the proposed reference link budget model is both the link budget developed for use in the ITU NGSO FSS sharing studies[34] and the link given in Appendix H of the Further Notice. A blended version of these links is proposed in Table A, which can be found in Appendix I to these Comments. This proposed link has been expanded and modified from the Appendix H link in the Further Notice. Modifications include:

- The illustration of several intermediate results in the calculations;
- The identification of a reference victim antenna horizon gain pattern;
- The addition of cross polarization isolation;
- A calculation of maximum MVDDS epfd; and
- Line items providing desired signal attenuation and noise increases due to rain.

This link budget closely parallels the procedure used during the NGSO FSS sharing studies. The parameters listed in the link are intended as an example, and the majority of the parameters were

taken from the "DIRECTV at 101; 6/7 code" table in Appendix B of the DBS Operators' Oxon Hill Report.

Appendix I also provides some relevant link budget examples. Table B in Appendix I describes a group of link budgets representing service from a particular set of satellites operating at 101° W.L. and using QPSK modulation with a 6/7 code rate. The victim earth station location is taken as Washington DC, but could be moved anywhere around the U.S. by recalculating the satellite e.i.r.p. Table C provides another example of a group of link budgets for a particular set of satellites operating at 101° W.L. and using QPSK modulation with a 2/3 code rate. The victim earth station location is taken as Seattle, Washington, but could be moved anywhere around the U.S. by recalculating the satellite e.i.r.p.

D. Establishment Of A Set Of Reference Parameters And Analytical Methods

The following is a proposed process for the Commission to establish a set of reference parameters and to establish a set of DBS link budgets to be protected. This process must occur prior to the establishment of final service rules.

1. DBS operators review, update and expand as necessary the set of reference DBS link budgets submitted for study and protection in the NGSO FSS proceedings at the ITU.[35] One link budget per operating mode per satellite or per satellite operating location should be sufficient, assuming that variations in e.i.r.p. over the country are taken into account by another mechanism (see Item 2. below). Included would be links that reasonably represent best estimates of future operating modes or future modulation and coding advances or future spacecraft operating locations. Link budgets should all be in the same form as Table A of Appendix I unless some special parameter or mode needs to be taken into account, except that the e.i.r.p value at each MVDDS transmitter location will be determined by the mechanism described in Item 2. below. Each budget must specify one

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[34] The full listing of the links used for the NGSO FSS studies can be found in Annex 1 of ITU-R Recommendation BO.1444, or at www.itu.int//itudoc/itu-r/sg11/docs/sg11/1998-00/contrib/138e2.html.

[35] *See id.*